

STATE OF IDAHO  
DEPARTMENT OF WATER RESOURCES  
BENEFICIAL USE FIELD REPORT

**A. GENERAL INFORMATION**

Permit No: 92-10101  
Exam Date: 6/17/2016

1. Current Owner:  
GAIL D HAGEN 1633 AIRWAY AVE LEWISTON ID 83501 (208) 790-4917
2. Accompanied by: Julie (Applicants daughter)
3. SOURCE: CRYSTAL CREEK                      TRIBUTARY: ST MARIES RIVER

**B. OVERLAP REVIEW**

1. Other water rights with the same place of use: None
2. Other water rights with the same point-of-diversion: None

**C. DIVERSION AND DELIVERY SYSTEM****1. LOCATION OF POINT(S) OF DIVERSION:**

CRYSTAL CREEK SW¼NW¼ Sec. 29, Twp 44N, Rge 01E, B.M. BENEWAH County

Method of Determination: GPS and maps. POD location at 47° 07.990, 116° 22.422

2.

**PLACE OF USE: RECREATION STORAGE**

| Twp | Rge | Sec | NE |    |    |    | NW |    |    |    | SW |    |    |    | SE |    |    |    | Totals |
|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------|
|     |     |     | NE | NW | SW | SE | NE | NW | SW | SE | NE | NW | SW | SE | NE | NW | SW | SE |        |
| 44N | 01E | 29  |    |    |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |        |
| 44N | 01E | 30  |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |    |    |        |

**PLACE OF USE: RECREATION**

| Twp | Rge | Sec | NE |    |    |    | NW |    |    |    | SW |    |    |    | SE |    |    |    | Totals |
|-----|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--------|
|     |     |     | NE | NW | SW | SE | NE | NW | SW | SE | NE | NW | SW | SE | NE | NW | SW | SE |        |
| 44N | 01E | 29  |    |    |    |    |    |    | X  |    |    |    |    |    |    |    |    |    |        |
| 44N | 01E | 30  |    |    |    | X  |    |    |    |    |    |    |    |    |    |    |    |    |        |

**DIVERSION TO STORAGE same as RECREATION**

Method of Determination: GPS and maps.

3.

Delivery System Diagram Attached (required). Indicate all major components and distances between components. Indicate weir size/pipe as applicable.

  X   Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be 1:24,000 or greater.

  X   Aerial Photo Attached (required for irrigation of 10+ acres).

  X   Photo of Diversion and System Attached

4.

| Well or Diversion ID No.* | Motor Make | Hp | Motor Serial No. | Pump Make | Pump Serial No. or Discharge Size |
|---------------------------|------------|----|------------------|-----------|-----------------------------------|
|                           |            |    |                  |           |                                   |
|                           |            |    |                  |           |                                   |
|                           |            |    |                  |           |                                   |
|                           |            |    |                  |           |                                   |

\*Code to correspond with No. on map and aerial photo

#### D. FLOW MEASUREMENTS

1.

| Measurement Equipment | Type | Make | Model No. | Serial No. | Size | Calib. Date |
|-----------------------|------|------|-----------|------------|------|-------------|
|                       |      |      |           |            |      |             |
|                       |      |      |           |            |      |             |

2. Measurements:

#### E. FLOW CALCULATIONS

Measured Method: UNABLE TO PERFORM FLOW MEASUREMENTS BECAUSE BOTH ENDS OF PIPES WERE UNDER WATER. MANNINGS EQUATION USED TO DETERMINE IF PIPE WAS ABLE TO DIVERT AMOUNT PERMITTED FOR. SEE ATTACHED MANNINGS FORM SHOWING PIPE IS CAPABLE OF DIVERTING PERMITTED AMOUNT.

       Additional Computation Sheets Attached

**F. VOLUME CALCULATIONS****1. Volume Calculations for Irrigation:**

$$V_{IR} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$$

$$V_{DR} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 =$$

$$V = \text{Smaller of } V_{IR} \text{ and } V_{DR} =$$
**2. Volume Calculations for Other Uses: SEE ATTACHED POND ANALYSIS SHEET.**RECREATION:  $0.20 \times 1.9835 \times 365 = 144.8 \text{ AF}$ **G. NARRATIVE/REMARKS/COMMENTS**

FIELD EXAM SHOWED APPLICANT HAD DEVELOPED POND IN A DIFFERENT LOCATION THEN HAD APPLIED FOR. 4 INCH PIPE FROM CREEK DIVERTED WATER TO POND AND ALLOWED FOR FLOW THROUGH. MANNINGS EQUATION SHOWED THE PIPE WAS CAPABLE OF DIVERTING 0.20 CFS FOR DIVERSION TO STORAGE AND RECREATION FLOW THROUGH. POND WAS 0.25 ACRES IN SIZE WITH A MAX DEPTH OF 12 FEET (12 FEET X 0.4 = 4.8) OR AVERAGE DEPTH OF 4.8 FEET. AMENDMENT WILL BE SENT TO CHANGE POINT OF DIVERSION AND ADD ANOTHER QQ FOR STORAGE.

Have conditions of permit approval been met? ☒ Yes ☐ No**H. RECOMMENDATIONS****1. Recommended Amounts**

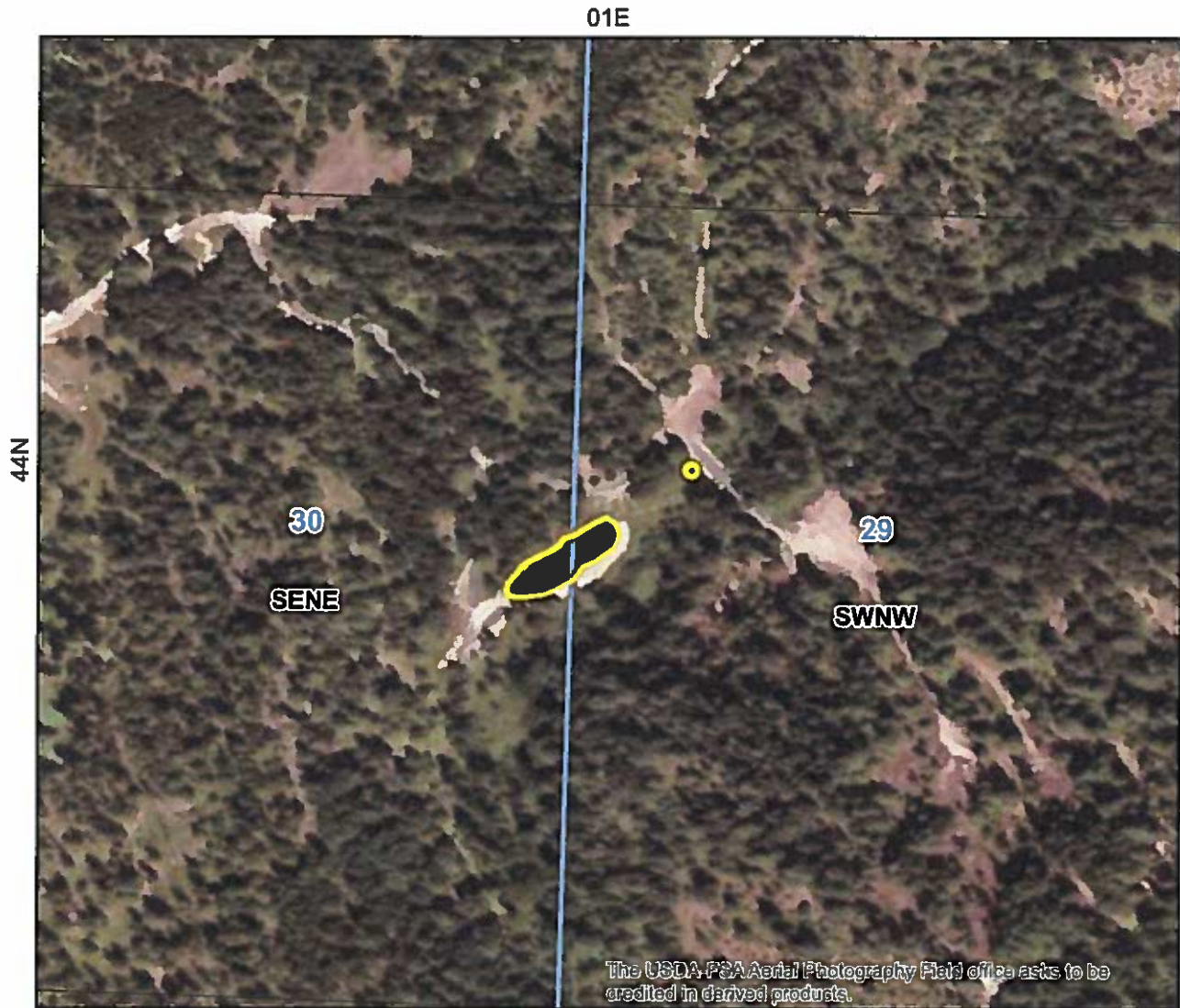
| <u>BENEFICIAL USE</u> | <u>PERIOD OF USE</u> | <u>DIVERSION RATE</u> | <u>ANNUAL VOLUME</u> |
|-----------------------|----------------------|-----------------------|----------------------|
| RECREATION            | 01/01 to 12/31       | 0.20 CFS              | 144.8 AF             |
| DIVERSION TO STORAGE  | 01/01 to 12/31       | 0.20 CFS              |                      |
| RECREATION STORAGE    | 01/01 to 12/31       |                       | 1.8 AF               |
| <u>Totals:</u>        |                      | 0.200 CFS             | 146.60 AF            |

**2. Recommended Amendments**
☒ Change P.D. as reflected above ☐ Add P.D. as reflected above ☐ None

☐ Change P.U. as reflected above ☒ Add P.U. as reflected above ☐ None
**I. AUTHENTICATION**Field Examiner's Name Adam Finkler Date 8-4-16Reviewer Morgan Case Date 8/9/16

State of Idaho  
Department of Water Resources  
**Water Right License**  
92-10101

Recreation Storage and Recreation



-  Point of Diversion
-  Place Of Use Boundary
-  Townships
-  PLS Sections

0 0.035 0.07 0.14 Miles



## Total Storage Calculations

|             |                |
|-------------|----------------|
| FILE NUMBER | 92-10101       |
| REVIEWER    | Adam Frederick |
| DATE        | 7/12/2016      |

This spreadsheet has been designed by Idaho Department of Water Resources to estimate the total seepage, evaporation and fill capacity required for a pond.

|                      |
|----------------------|
| User Input           |
| Calculated value     |
| Formula Explanations |

|                                                                                              |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Surface Area (AC.)                                                                           | 0.25 | "Surface Area" is automatically carried over from the "Seepage Loss" sheet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Average Pond Depth (FT.)                                                                     | 4.8  | "Average Pond Depth" depicts the actual depth of the pond either measured or estimated. Note: If you know the maximum depth and not the average depth, the Field Examiner's Handbook suggests multiplying the maximum depth by 0.4 to get the average depth, or you can use any method that seems reasonable to attain average depth.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Pond Capacity (AF)                                                                           | 1.2  | Pond Capacity is calculated by multiplying the Pond Surface Area by the Average Pond Depth. If you know the capacity, divide the capacity by surface area and enter the average pond depth in the space above.<br><i>Note: If pond capacity is determined using a method shown on the "Pond Capacity" sheet, the user may need to modify the value of "Pond Capacity" (cell B9) manually. Note that if the value is modified manually, the formula will be altered for future use.</i>                                                                                                                                                                                                                                                                                                                                                                                         |
| Multiple Fill Volume Above Initial Fill to Fulfill From Storage Needs- "Multiple Fills" (AF) | 0    | The "Multiple Fill Volume Above Initial Fill" is the acre-feet of water required to meet a <i>from storage</i> component if the <i>from storage</i> component exceeds a one time fill. This section should not include the amount of water needed to fill the pond initially or the amount of water needed to maintain the pond level due to evaporation or seepage. For example: if a pond has a capacity of 5 acre feet and 2.5 acre feet of seepage and evaporation, but the pond is used for irrigation that requires 10 acre feet of from storage for the irrigation use, then you would insert 5 acre feet into this location (10 acre feet needed - 5 acre feet from the initial fill = 5 acre feet of additional storage needed).<br><i>Note: You must have a "From Storage" component exceeding the initial fill on the permit to include a volume in this space.</i> |
| Estimated Seepage Loss (AF)                                                                  | 0.3  | The "Estimated Seepage Loss" is automatically carried over from the "Seepage Loss" sheet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Estimated Evaporation Loss (AF)                                                              | 0.3  | The "Estimated Evaporation Loss" is automatically carried over from the "Evaporation Loss" sheet.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Total Volume Required (AF)                                                                   | 1.8  | The "Total Volume Required" is calculated by adding the Pond Capacity, Multiple Fills, Seepage Loss, and Evaporation Loss amounts to determine the total amount of storage required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

READ ME

### Manning's Equation Calculator for Flow Rate in a Circular Conduit Flowing Full

S = 0.0294 ft/ft  
 n = 0.009 manning's coefficient  
 d = 4.0 pipe diameter (inches)  
 D = 0.33 pipe diameter (feet)  
 r = 0.17 pipe radius (feet)  
 A = 0.09 area (ft<sup>2</sup>)  
 WP = 1.05 wetted perimeter (ft)  
 R = 0.08 hydraulic radius (ft)

Q = 0.47 flow rate (CFS)

### Channel Slope

Slope Options

☐ Manual Entry ☒ Slope Calculator

### Slope Calculator

Rise = 5 feet  
 Run = 170 feet  
 Slope, S = 0.0294 ft/ft

Pipe Material, (n):

plastic (pvc, abs)

Pipe Diameter (inches)

4.0 inches

Manning's Equation (1), is an empirical formula that solves for velocity (v) in a open channel under uniform flow. The continuity equation (2) when combined with equation (1) allows for the computation of the flow rate (Q) in an open channel under uniform flow.

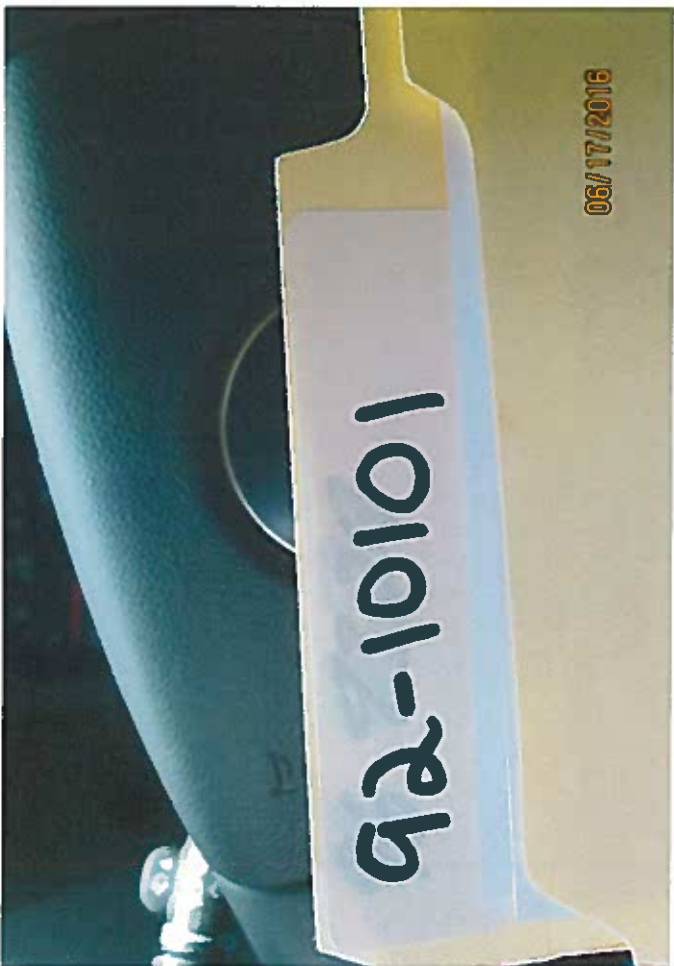
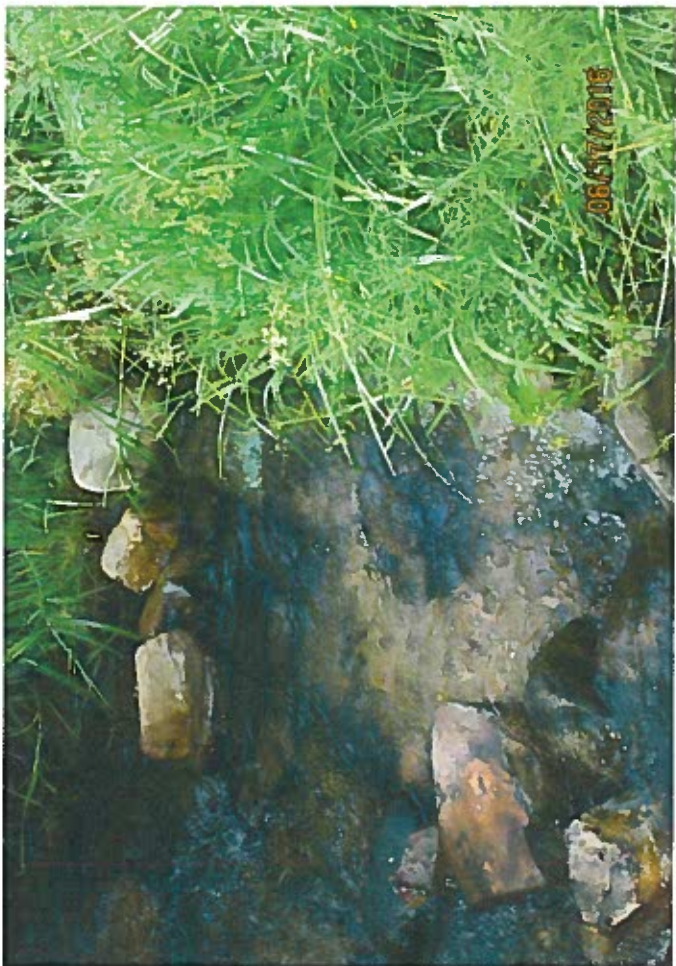
In equations (1) and (3),  $\eta$  refers to Manning's Coefficient of Roughness and can be found in tabulated form for many open channel types. R is the hydraulic radius of the open channel and equal to the area of the open channel divided by the wetted perimeter,  $R = A/P$ . S is the slope of the energy grade line which often assumed to be equal to the slope of the channel.

Because Manning's Equation is empirical the units are not arbitre To obtain a velocity in ft/s and a flow rate in ft<sup>3</sup>/s, area must be reported in ft<sup>2</sup>, hydraulic radius must be reported in ft, and S must be reported in ft/ft. Manning's Coefficient of Roughness is a unitless constant.

$$(1) \quad v = 1.49 \left( \frac{1}{\eta} \right) \left( R^{\frac{2}{3}} \right) \sqrt{S}$$

$$(2) \quad Q = vA$$

$$(3) \quad Q = 1.49 \left( \frac{1}{\eta} \right) (A) \left( R^{\frac{2}{3}} \right) \sqrt{S}$$



92-10101

